PATENT SPECIFICATION (11) 1 302 022

1 302 022

DRAWINGS ATTACHED

(21) Application No. 50047/68 (22) Filed 22 Oct. 1968

(23) Complete Specification filed 22 Jan. 1970

(44) Complete Specification published 4 Jan. 1973

(51) International Classification A61C 5/10

(52) Index at acceptance
A5R 75B
B5A 1R14A 1R14C1X 1R54

(54) IMPROVEMENTS IN OR RELATING TO THE MANUFACTURE OF DENTAL CROWNS

(71) We, TECHNICAL DENTAL DEVELOPMENTS (LONDON) LIMITED, a British company, of 45 Doughty Street, London, W.C.1, do hereby declare the invention,

for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to the manufacture of dental crowns and, more particularly, to the production of the model of the cut tooth on which the crown is to be built-up preparatory to positioning in the mouth of the patient.

Before a dental crown can be made, an impression of the cut tooth, on which the crown is mounted, must be provided by a dental surgeon. From this impression, by simple casting techniques, a model of the tooth so cut is produced. On this model the dental crown is built. Therefore, the model must possess a high degree of accuracy.

One material which is used for casting such a model is a polyester resin containing metal particles, this material being solidified by polymerisation, for example, by the addition of a benzole peroxide catalyst. Silver or gold flakes may be added to the polyester resin for colouring purposes. The disadvantage of using such material for casting the model is that polyester resins are subject to contraction or shrinkage on polymerisation so that the model produced may not be an accurate representation of the cut tooth, but will be of smaller dimensions.

An object of the present invention is to reduce the shrinkage which normally occurs when casting a model of a cut tooth from polyester resin.

To this end the invention consists in a method of making a model of a cut tooth for use in the production of a dental crown which is to be mounted on the cut tooth, in which the model is cast in an impression of the cut tooth with a liquid polyester resin which is solidified by polymerisation, and in which a peg moulded from an acrylic resin is introduced into the impression after filling thereof with the liquid resin and before polymerisation is complete, thereby reducing the volume of the resin required to fill the impression and the amount of material subject to contraction and exothermic heat of reaction. Thus, a more accurate reproduction of a model of the original cut tooth is obtained. Moreover, the peg provides a convenient means for holding and supporting the model during further steps in the process and the dental crown may conveniently be built on the model whilst it remains attached to the peg.

The peg is moulded from an acrylic resin and this readily adheres to the polyester resin of which the model is cast so that the model is firmly secured to the peg. Moreover, when the peg is moulded from such resin, it floats on the material disposed in the impression and no clamp is required to hold the peg in the correct position and to prevent it sinking to the bottom of the impression.

The end of the peg to be inserted into the impression may be shaped as a cut tooth portion so that it follows the shape of the impression and the cast material is of substantially uniform wall thickness at all points of the model. If the end of the peg is too large for a particular impression, it may be cut to the required size. In the case of producing crowns for molar teeth, the end of the peg to be inserted into the impression of the cut molar may be moulded with a double apex so as to conform to the shape of such an impression.

It is intended to provide a range of pegs of different shapes and sizes at their ends to be inserted into the cut tooth impressions so as to enable an appropriate shaped and sized peg to be selected for a particular model. If necessary, a selected peg may be reduced in size by cutting in order to produce a peg of the appropriate dimensions.

The shrinkage of the cut tooth model may be further reduced by casting the model with a liquid polyester resin filled with metal balls made from metal having a higher specific gravity than the specific gravity of the liquid

resin, as described in our co-opending patent application No. 7024/72 (Serial No. 1302023). When the metal balls are in contact to the fullest extent possible, it is impossible for contraction of the liquid resin, upon polymerisation, to reduce the overall dimensions of the model to any significant extent.

The balls may be formed from a base metal, such as copper or aluminium, and may be contacted together by the action of gravity, agitation or vibration, or by the application of pressure or centrifugal force. The balls may also be made from ferrous metal, in which case magnetism may be applied to assist agglomeration or packing of the balls. When the liquid resin is solidifed by polymerisation, there is adequate cohesion between the balls and the resin to form a solid mass conforming to the shape of the impression mould. The size of the balls is preferably such that they will pass through a screen having a mesh size in the range from 120 to 300 perforations per inch and, for optimum results, the balls should be of equal size. In this connection, it is important to note that when balls of equal size are in contact, substantially uniform spaces exist between them which, when occupied by resin, provides maximum and uniform cohesion.

In the accompanying drawings:—

FIG. 1 illustrates a peg for use in the present invention and

FIG. 2 illustrates the peg inserted into an impression of a cut tooth.

Referring to Fig. 1, the peg is moulded from acrylic resin and has one end portion 1 moulded to conform approximately to the shape of a model of a cut tooth on which a crown is to be fitted. This end portion is inserted into an impression of the cut tooth after filling of the impression with a liquid polyester resin, but before polymerisation of the casting is complete, so as to reduce the volume of resin necessary to fill the mould and thereby reduce shrinkage of the cast model. When the model has been cast it is removed from the impression and is finished by removal of excess material. The cast model adheres to the end of the peg and may be manipulated and mounted by means of its shank portion 2 so as to enable the crown to be built-up thereon in a conventional manner.

Fig. 2 illustrates the peg with its end portion 1 inserted into an impression 3 of a cut tooth. At its upper end, the impression is extended upwards, conveniently, by means of a paper sheet 4, for example, a sticky label, adhered to the outside of the impression. As mentioned above, the peg is introduced after filling of the impression but before polymerisation is complete and it floats on the surface of the material in the correct position so that no external fixing or location is required. The peg floats with its annular flange 5, which is moulded about the peg adjacent the base of the end portion 1, resting on the surface of the material in the impression. In the case illustrated in Fig. 2, the material used for casting the model comprises a liquid polyester resin filled with small metal balls 6 which have a higher specific gravity than the specific gravity of the liquid resin. In order to produce the desired results, the metal balls must be, as far as possible, in contact with one another. This may occur under the action of gravity when the material is introduced into the impression and may be assisted by agitation or vibration of the impression. By casting the model as illustrated in Fig. 2, any shrinkage of the model is minimised so that the resulting model posses a high degree of accuracy.

WHAT WE CLAIM IS:—

1. A method of making a model of a cut tooth for use in the production of a dental crown which is to be mounted on the cut tooth, in which the model is cast in an impression of the cut tooth with a liquid polyester resin which is solidified by polymerisation, and in which a peg moulded from an acrylic resin is introduced into the impression after filling thereof with the liquid resin and before polymerisation is complete, thereby reducing the volume of the resin required to fill the impression and the amount of material subject to contraction and heat of reaction.

2. A method as claimed in claim 1, in which the end portion of the peg to be inserted into the impression is formed as a cut-tooth portion approximately conforming to the shape of the impression.

3. A method as claimed in claim 2, in which prior to introduction into the impression, said end of the peg is reduced to the required size by cutting.

4. A method as claimed in any one of the preceding claims, in which the open end of the impression is extended by means of a paper sheet adhered about the outside of the impression.

5. A method as claimed in any one of the preceding claims, in which the cast model is removed from the impression and is finished by the removal of excess material.

6. A method of making a model of a cut tooth, substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings.

7. A method of making a dental crown, in which a model of the cut tooth on which the crown is mounted is produced by the method claimed in any one of the preceding claims, and the dental crown is built on said model whilst attached to said peg.

8. A model of a cut tooth produced by the method claimed in any one of the preceding claims 1 to 6.

9. A dental crown produced by the method claimed in claim 7.

10. A model of a cut tooth, in which the

model is cast from polyester resin and is secured to one end portion of a peg moulded from an acrylic resin.

11. A model as claimed in claim 10, wherein said one end portion of the peg has a shape substantially conforming with the shape of the model cast thereon.

BARON & WARREN,
16, Kensington Square,
London,
Chartered Patent Agents.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1973.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1302022 COMPLETE SPECIFICATION
1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

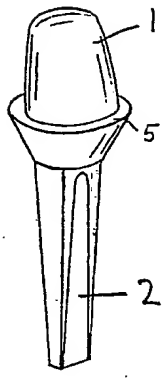

Fig.1

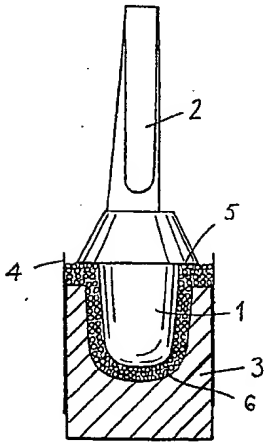

Fig.2